2005 ANGLER USE AND HARVEST SURVEY OF THE MISSOURI RIVER IN SOUTH DAKOTA AND NEBRASKA FROM FORT RANDALL DAM TO GAVINS POINT DAM

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2005 ANGLER USE AND HARVEST SURVEY OF THE MISSOURI RIVER IN SOUTH DAKOTA AND NEBRASKA FROM FORT RANDALL DAM TO GAVINS POINT DAM

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PREFACE

Information collected from Lewis and Clark Lake during 2005 is summarized in this report. Copies of this report and references to the data can be made with permission from the author or the Director of the Division of Wildlife, South Dakota Department of Game, Fish, and Parks, 523 E. Capitol, Pierre, South Dakota 57501-3182.

The authors would like to acknowledge the following individuals who helped with data collection, analysis, editing, and manuscript preparation: from South Dakota, John Lott and Ron Grandi; from Nebraska, Phil Chvala, Jason Miller, and Brandon Viterna. The collection of data for these surveys was funded, in part, by Federal Aid in Sport Fish Restoration, (D-J) project F-21-R-38, "Statewide Fish Management Surveys".

EXECUTIVE SUMMARY

This report includes data from an angler use and harvest survey conducted during 2005 on the Missouri River from Ft. Randall Dam to Gavins Point Dam. This survey provided a means to evaluate management objectives and strategies outlined in the Missouri River Program strategic plan. Results and discussion in this report relate to angler use of the resource and fish harvest.

An estimated 165,028 hours of angling pressure were expended on the Missouri River between Ft. Randall Dam and Gavins Point Dam during the March through November 2005 period. Fishing pressure peaked in June and was highest in the Lewis and Clark Lake section of the study area.

An estimated total 35,972 fish were harvested. The highest estimated total harvest occurred at Lewis and Clark Lake (20,145 fish). Channel catfish and walleye were the most abundant species in the angler harvest, at an estimated 12,282 and 9,001 fish, respectively.

Monthly estimated total catch rate (all species combined) ranged from 0.48 to 0.62 fish/h, total release rate ranged from 0.28 to 0.34 fish/h, and total harvest rate ranged from 0.19 to 0.33 fish/h during the March through November 2005 period. Harvest rates were highest for channel catfish and walleye in the Ft. Randall Dam tailwater, while release rate was highest for freshwater drum. Catch, release, and harvest rates for walleye from Lewis and Clark Lake were higher than for other species. Catch, release, and harvest rates for the Missouri River between Lewis and Clark Lake and Ft. Randall Dam tailwater were higher for channel catfish than for all other species.

Anglers from 15 states were contacted during the 2005 survey. Resident anglers were primarily from Knox County, Nebraska and Bon Homme and Yankton Counties, South Dakota. Anglers were fishing primarily for walleye, followed by “anything.” Approximately 40% of the anglers responding to trip satisfaction questions indicated some degree of satisfaction with their angling experience. The Ft. Randall Dam to Gavins Point Dam Missouri River fishery had an estimated impact of over $2.3 million to the local economy during the March through November 2005 period.

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2005 ANGLER USE AND HARVEST SURVEY OF THE MISSOURI RIVER IN SOUTH DAKOTA AND NEBRASKA FROM FORT RANDALL DAM TO GAVINS POINT DAM

INTRODUCTION

The Missouri River between Ft. Randall and Gavins Point Dams provides a valuable fisheries resource for the states of South Dakota and Nebraska. This river reach annually supports over 100,000 hours of fishing activity (Stone 1985; Wickstrom 1995; Wickstrom 1996; Mestl et al. 2001; Wickstrom et al 2002). Because of the importance of this fishery, the fish community must be effectively managed to provide optimal recreational benefits. A prerequisite to development of effective management strategies is the acquisition and analysis of data that includes angler use of the resource. This report includes data collected during 2005 and analysis of those data. Objectives were to document angler use and sportfish harvest on the Missouri River from Ft. Randall Dam to Gavins Point Dam. These studies of the Missouri River are designed to fulfill strategies and evaluate objectives of the Missouri River Fisheries Program strategic plan (South Dakota Department of Game, Fish and Parks 1994).

STUDY AREA

For this survey, the Missouri River from Ft. Randall Dam to Gavins Point Dam was divided into three zones (Figure 1). Zone 1 included the Ft. Randall Dam tailwater downstream to the head of the first island below the spillway boat ramp (river mile 880 to 878). Zone 2 was the Middle Missouri River and extended downstream from Zone 1 to the mouth of Bazile Creek (river mile 878 to 838). Zone 3 was Lewis and Clark Lake and extended from Zone 2 to Gavins Point Dam (river mile 838 to 810). The Missouri River study reach serves as the boundary between South Dakota and Nebraska downstream of river mile 875 in Zone 2 and all of Zone 3. A complete list of access points, by zone, appears in Appendix 1.

METHODS

An angler use and harvest survey was conducted on the Missouri River from Ft. Randall Dam to Gavins Point Dam from March 1 to November 30, 2005. Traditional access point surveys (Malvestuto 1996) were used to gather data from anglers at Ft. Randall Dam tailwater, the Middle Missouri River, and Lewis and Clark Lake. Data collection was conducted throughout daylight hours during either of two periods that began at sunrise or ended at sunset. The South Dakota Department of Game, Fish, and Parks and the Nebraska Game and Fish Commission each employed a survey clerk to make counts of anglers engaged in fishing activity and gather data from anglers at access points along the study area.

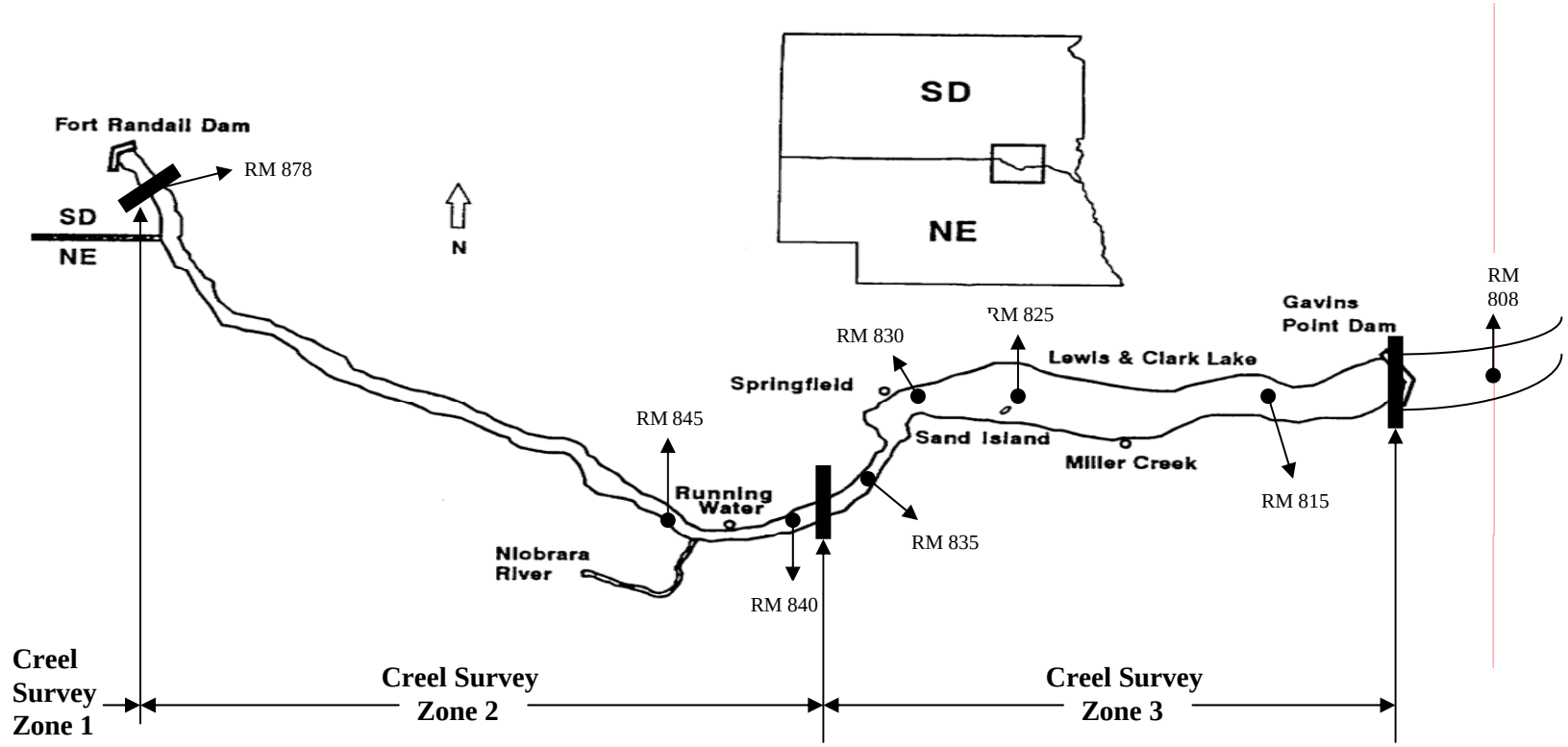

Figure 1. Lewis and Clark Lake and Missouri River study area from river mile (RM) 810 to 880.

Pressure counts were made ten days per month (six week days and four weekend/holiday days) in each zone. Counts were made twice daily in Zone 1, and once daily in Zones 2 and 3. Lewis and Clark Lake (Zone 3) was divided into two sub-zones (east and west) for pressure counts that were made simultaneously by two clerks. Boat and shore anglers were interviewed in each zone when clerks were not doing pressure counts. Efforts were made to contact anglers at the end of their fishing trip. Also, anglers at Lewis and Clark Lake were periodically interviewed while on the water, engaged in fishing activity.

Data collected from angler interviews and pressure counts for each zone were entered into a personal computer program (Newcomb 1992) for analysis. Estimates of angler hours, mean party size, mean trip length, catch, harvest, and release by species; and catch, harvest, and release rates, by species, were computed for each zone. Estimates from each zone were summed to determined total catch, harvest, and release by species and total fishing pressure for the entire study reach. Ninety-percent confidence intervals (CI) were used as the basis for determination of significant differences between estimated values. Common and scientific names of fishes mentioned in this report are provided in Appendix 2.

RESULTS AND DISCUSSION

Fishing Pressure

Anglers expended an estimated 165,028 hours (+/- 18,296 h, 90% CI) fishing the Missouri River between Ft. Randall Dam and Gavins Point Dam (Zones 1 – 3; Figure 1) during March 1 through November 30, 2005 (Table 1). Total angler hours estimated for the 2005 March through November period was within the range of previous surveys conducted on the Missouri River between Ft. Randall and Gavins Point Dams (Table 2). Estimated total angler hours in 2005 was not significantly different from total angler hours in 2001.

Estimated fishing pressure at the Ft. Randall Dam tailwater and the Middle Missouri River (Table 2) in 2005 were 33% and 34%, lower, respectively than in 2001. Low releases at Ft. Randall Dam during March, May, June, and July of 2005 (USACE 2005), that made boating difficult, if not impossible, were likely responsible for decreased angling hours at Ft. Randall Dam tailwater and the Middle Missouri River zones (Table 3). Fishing pressure at Lewis and Clark Lake was similar in 2001 and 2005.

Fishing pressure, for all zones combined in 2005, peaked in June, but was not significantly different from May, August, September, and October (Table 1). Lewis and Clark Lake (Zone 3) had the highest angler hours for all months combined during 2005 and Ft. Randall tailwater (Zone 1) had the lowest angler hours (Table 1).

Boat anglers expended approximately 3.8 times more hours fishing than shore anglers did during 2005 (Table 4). The highest ratio of boat angler hours to shore angler hours occurred in the Middle Missouri River (4.9:1, Zone 2), where only an estimated 6,406 (+/- 1,100, 90% CI) shore angler hours were expended. Shore angler hours were highest at Lewis and Clark Lake (Zone 3), but were still only one-fourth the number of boat angler hours.

Table 1. Estimated fishing pressure (angler hours), by month and zone, for the Missouri River from Ft. Randall Dam to Gavins Point Dam during 2005 (90 % CI).

Zone	Mar.	April	May	June	July	Aug.	Sept	Oct.	Nov.	Total
1	3,206 (1,954)	2,293 (1,739)	1,950 (921)	3,893 (2,126)	4,032 (1,163)	4,596 (1,060)	2,546 (1,205)	1,238 (403)	476 (329)	24,228 (3,516)
2	5,380 (3,115)	4,495 (1,846)	7,336 (4,311)	3,077 (932)	4,988 (1,579)	4,825 (1,215)	3,832 (1,972)	3,069 (1,360)	1,007 (536)	38,009 (5,571)
3	784 (584)	7,368 (3,686)	12,325 (3,332)	23,195 (4,383)	9,435 (1,906)	9,226 (2,603)	17,407 (5,114)	15,935 (3,468)	7,117 (4,507)	102,791 (9,202)
Total	9,370 (5,653)	14,156 (7,271)	21,611 (8,564)	30,165 (7,441)	18,455 (4,648)	18,647 (4,878)	23,785 (8,291)	20,242 (5,446)	8,600 (5,372)	165,028 (18,289)

Table 2. Estimated hours of fishing pressure, by zone and year, April through September, on the Missouri River from Ft. Randall Dam to Gavins Point Dam. FRTW is Ft. Randall tailwater and L&C is Lewis and Clark Lake.

Year	FRTW	Middle River	L&C	Total	Reference
1984	41,499	40,888	19,874	102,261	Stone 1985
1994	35,222	36,332	50,278	121,932	Wickstrom 1995
1995*	30,533	60,697	100,313	191,543	Wickstrom 1996
2000	48,401	85,879	90,329	224,609	Mest et al. 2001
2001	36,201	57,331	156,685	250,217	Wickstrom et al. 2002
2005+	24,228	38,009	102,791	165,028	This study

* May – September estimates

+ March - November

Table 3. Minimum daily discharge (cubic feet/second) at Ft. Randall Dam during 2005.

Month	Discharge
January	4,500
February	900
March	600
April	1,400
May	0
June	500
July	600
August	3,100
September	8,600
October	6,100
November	3,200
December	900

Table 4. Estimated fishing pressure (angler hours), for boat and shore fishing, for the Missouri River from Ft. Randall Dam to Gavins Point Dam, March through November 2005 (90 % CI).

Zone	Boat	Shore	Total
1	16,451 (2,403)	7,777 (1,688)	24,228 (3,516)
2	31,603 (5,203)	6,406 (1,100)	38,009 (5,571)
3	82,644 (8,245)	20,147 (2,293)	102,791 (9,209)
Total	130,698 (15,851)	34,330 (5,081)	165,028 (18,296)

Fish Harvest

An estimated 35,972 (+/- 8,597, 90% CI) fish, of all species combined, were harvested from the Missouri River from Ft. Randall Dam to Gavins Point Dam (Zones 1 – 3; Figure 1) during 2005 (Table 5). Channel catfish and walleye were most abundant in the harvest. An estimated 67,338 (+/- 30,220, 90% CI) fish, of all species, were harvested from Ft. Randall Dam to Gavins Point Dam during April through September 2001 (Wickstrom et al. 2002), the most recent year this area of the Missouri River was surveyed. Walleye, channel catfish, and freshwater drum comprised the majority of the angler harvest in 2001.

Channel catfish and walleye were the most harvested species at Ft. Randall Dam tailwater during the 2005 survey (Zone 1; Table 6). The highest monthly harvest of channel catfish occurred in July and August, while the highest monthly harvest of walleye occurred in August. An estimated 1,140 (+/- 969, 90% CI) brown trout were harvested at Ft. Randall tailwater in a put-and-take fishery. Brown trout are annually stocked soon after ice-out in the Ft. Randall Dam tailwater boat basin and the majority of the trout harvest occurs during April. Channel catfish were the most-harvested species in the Middle Missouri River (Zone 2), with the highest monthly harvest occurring in May and July (Table 7). Walleye and channel catfish were the most harvested species in Lewis and Clark Lake (Table 8) and the highest monthly harvest of both species occurred in June. Included in the "Other" category harvested at Lewis and Clark Lake were an estimated 2,085 (+/- 2,780, 90 % CI) bluegills.

Length frequencies of angler-harvested walleyes from all survey zones (Zones 1-3: Figure 1) during 2005 are shown in Figure 2. The Missouri River reach from the South Dakota/Nebraska state line to Gavins Point Dam has a year-round 381-mm-length limit regulation in effect for walleye and sauger. Ft. Randall tailwater has a year-round 381-mm-length limit in effect for walleye and sauger except during July and August. A few legal walleyes less than 381 mm in length were observed in the harvest at Ft. Randall tailwater during July and August of 2005. A

few illegal walleyes less than 381 mm were observed in the harvest from the Middle Missouri River and from Lewis and Clark Lake.

Length frequencies of angler-harvested channel catfish, from all survey zones (Zones 1-3; Figure 1) during 2005, are shown in Figure 3. Large fish (<600 mm) were harvested from all survey zones, but the highest percentage of large fish in the harvest occurred in Lewis and Clark Lake. Channel catfish over 780 mm were observed in the harvest from all zones (Figure 3).

Few anglers fishing the Missouri River between Ft. Randall Dam and Gavins Point Dam harvested a limit of walleyes (Table 9). Lewis and Clark Lake (Zone 3), which had by far the highest number of walleye harvested (Table 5), also had the highest percentage of anglers harvest a limit of walleye (Table 9). Ft. Randall Dam tailwater (Zone 1) had the second highest number of walleyes harvested but no anglers were contacted that harvested a limit of walleye (Table 5).

Table 5. Estimated fish harvest, by species and zone, for the Missouri River from Ft. Randall Dam to Gavins Point Dam during March through November 2005 (90 % CI).

Zone	Walleye	Sauger	Channel catfish	Smallmouth bass	Largemouth bass	White bass	Bluegill	Other*	Total
1	1,652 (458)	164 (74)	2,585 (756)	692 (333)	14 (12)	967 (655)	0	1,966 (1,658)	8,040 (2,002)
2	1,523 (663)	784 (264)	4,447 (1,517)	258 (114)	8 (10)	42 (33)	10 (14)	715 (658)	7,787 (2,040)
3	5,826 (1,461)	830 (308)	5,250 (1,429)	301 (207)	1,432 (904)	2,096 (1,307)	2,085 (2,780)	2,323 (1,316)	20,145 (4,555)
Total	9,001 (2,582)	1,778 (646)	12,282 (3,702)	1,251 (654)	1,454 (926)	3,105 (2,801)	2,095 (2,794)	5,004 (3,632)	35,972 (8,597)

* Other includes: black bullhead, black crappie, brown trout, buffalo, common carp, flathead catfish, freshwater drum, goldeye, northern pike, rainbow trout, rock bass, shorthead redhorse, yellow perch, white crappie, and white sucker.

Table 6. Estimated fish harvest, by species and month, for Ft. Randall Dam tailwater during 2005 (90% CI).

Month	Walleye	Sauger	Channel catfish	Smallmouth bass	White bass	Northern pike	Other*	Total
March	212 (151)	19 (18)	21 (16)	3 (4)	3 (4)	0	302 (420)	560 (479)
April	84 (76)	19 (20)	10 (15)	8 (14)	0	0	857 (1,068)	980 (1,145)
May	246 (184)	5 (7)	20 (18)	14 (19)	32 (43)	0	31 (48)	348 (229)
June	166 (165)	28 (36)	175 (209)	92 (110)	590 (730)	0	360 (417)	1,411 (1,409)
July	134 (105)	26 (29)	924 (550)	0	143 (128)	6 (9)	175 (260)	1,409 (903)
August	753 (418)	44 (59)	722 (559)	73 (37)	105 (76)	32 (33)	136 (200)	1,866 (786)
Sept.	37 (42)	7 (9)	388 (207)	46 (38)	29 (37)	38 (31)	42 (57)	586 (232)
Oct.	19 (31)	0	324 (248)	320 (321)	65 (104)	0	0	728 (460)
Nov.	0	16 (28)	0	136 (174)	0	0	0	152 (201)
Total	1,651 (458)	164 (74)	2,584 (758)	692 (333)	967 (655)	76 (40)	1,903 (1,630)	8,040 (2,002)

* Other includes: black crappie, brown trout, buffalo, common carp, flathead catfish, freshwater drum, goldeye, largemouth bass, rainbow trout, yellow perch, and white crappie.

Table 7. Estimated fish harvest, by species and month, for the Middle Missouri River during 2005 (90% CI).

Month	Walleye	Sauger	Channel catfish	Smallmouth bass	White bass	Northern pike	Other*	Total
March	638 (505)	337 (238)	82 (92)	92 (97)	0	59 (58)	7 (11)	1,216 (850)
April	195 (106)	169 (123)	151 (119)	12 (16)	31 (33)	8 (8)	36 (53)	602 (340)
May	428 (575)	139 (111)	1,246 (1,101)	32 (34)	11 (20)	21 (34)	327 (460)	2,204 (1,713)
June	56 (46)	4 (6)	625 (439)	0	0	0	61 (81)	745 (474)
July	17 (25)	4 (6)	1,036 (865)	36 (53)	0	0	128 (205)	1,221 (838)
August	68 (71)	0	524 (628)	60 (57)	0	0	42 (63)	694 (606)
Sept.	117 (83)	96 (103)	383 (533)	0	0	0	23 (36)	617 (586)
Oct.	0	10 (16)	367 (506)	13 (19)	0	0	0	390 (501)
Nov.	3 (6)	25 (35)	34 (55)	13 (17)	0	0	22 (36)	98 (89)
Total	1,522 (663)	784 (264)	4,448 (1,518)	258 (114)	42 (33)	88 (57)	645 (631)	7,788 (2,022)

* Other includes: black bullhead, black crappie, bluegill, brown trout, buffalo, common carp, flathead catfish, freshwater drum, largemouth bass, rainbow trout, shorthead redhorse, and white sucker.

The Middle Missouri River was the only zone where parties harvested seven or more channel catfish per angler-trip and also had the highest percentage of anglers harvesting no channel catfish (Table 10). Ft. Randall Dam tailwater had the highest percentage of parties harvest ing six or more channel catfish per angler-trip. However, channel catfish can be legally harvested in unlimited numbers at Ft. Randall Dam tailwater and the Middle Missouri River where it is entirely in South Dakota. Over six percent of the parties at Lewis and Clark Lake harvested their limit of five channel catfish per angler.

Table 8. Estimated fish harvest, by species and month, for Lewis and Clark Lake during 2005 (90% CI).

Month	Walleye	Sauger	Channel catfish	Smallmouth bass	White bass	Largemouth bass	Other*	Total
March	0	0	30 (36)	0	0	0	82 (133)	153 (234)
April	749 (741)	240 (244)	369 (293)	0	1069 (153)	0	492 (451)	1,959 (1,455)
May	363 (230)	159 (139)	462 (346)	0	921 (1,213)	13 (20)	258 (302)	2,175 (1,721)
June	2,409 (1,202)	77 (80)	2,380 (1,097)	0	814 (852)	0	516 (529)	6,196 (2,496
July	144 (149)	0	188 (262)	38 (43)	0	13 (19)	135 (171)	955 (669)
August	280 (185)	28 (38)	661 (816)	174 (224)	0	0	2,156 (3,431	3,356 (3,300
Sept.	887 (657)	60 (65)	748 (644)	46 (47)	35 (47)	69 (72)	302 (320)	2,347 (1,636
Oct.	593 (348)	220 (182)	68 (78)	27 (44)	55 (89)	837 (669)	159 (195)	1,960 (1,178
Nov.	401 (427)	46 (62)	0	16 (21)	0	500 (809)	82 (128)	1,045 (915)
Total	5,826 (1,461)	830 (308)	5,250 (1,429)	301 (207)	2,096 (1,307	1,432 (904)	4,410 (3,887	20,145 (4,555

* Other includes: black bullhead, black crappie, bluegill, common carp, flathead catfish, freshwater drum,
northern pike, rock bass, and white crappie.

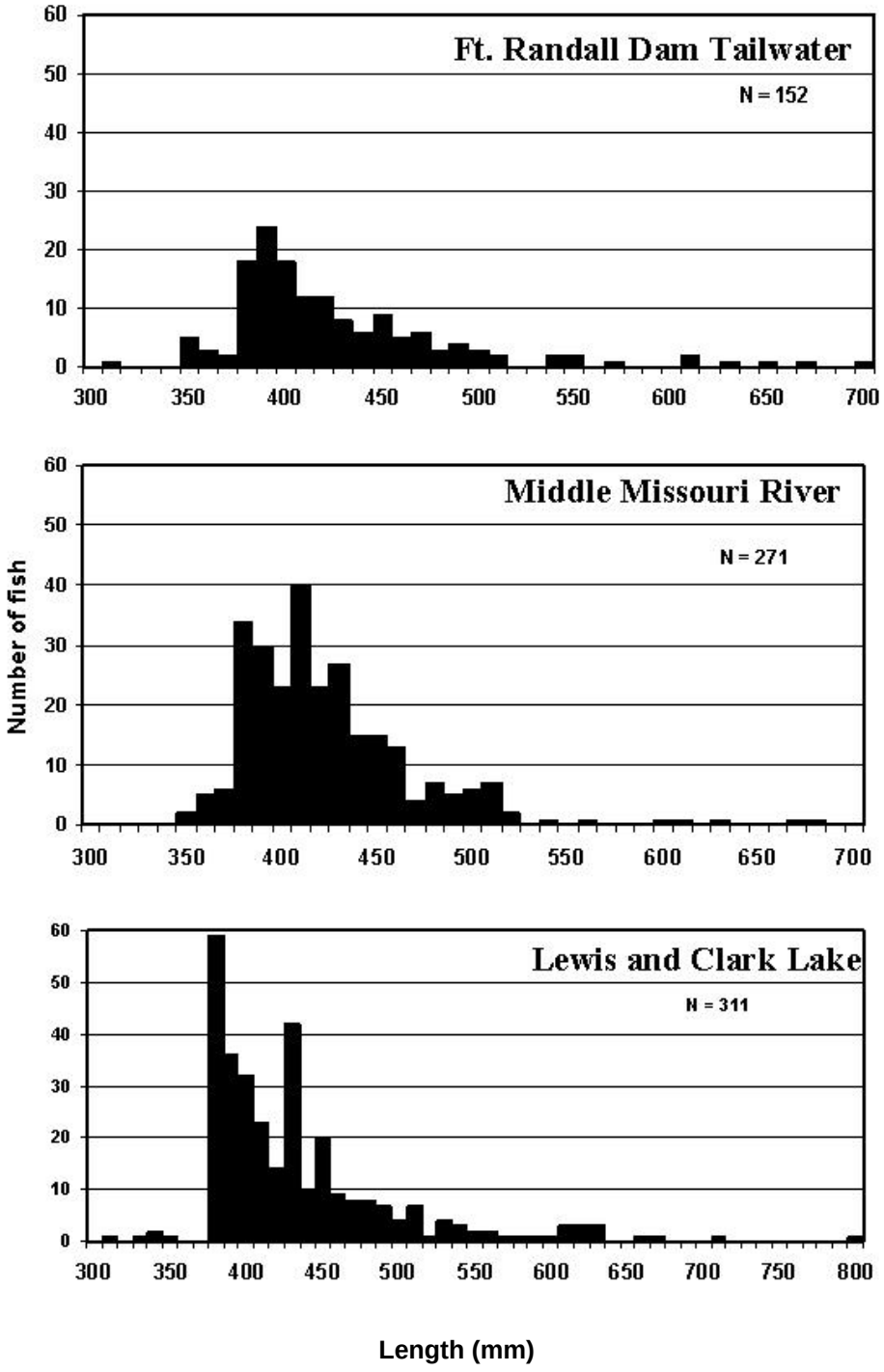

Figure 2. Length frequencies of angler-harvested walleye in the Missouri River, from Ft. Randall Dam to Gavins Point Dam during 2005. N is the sample size.

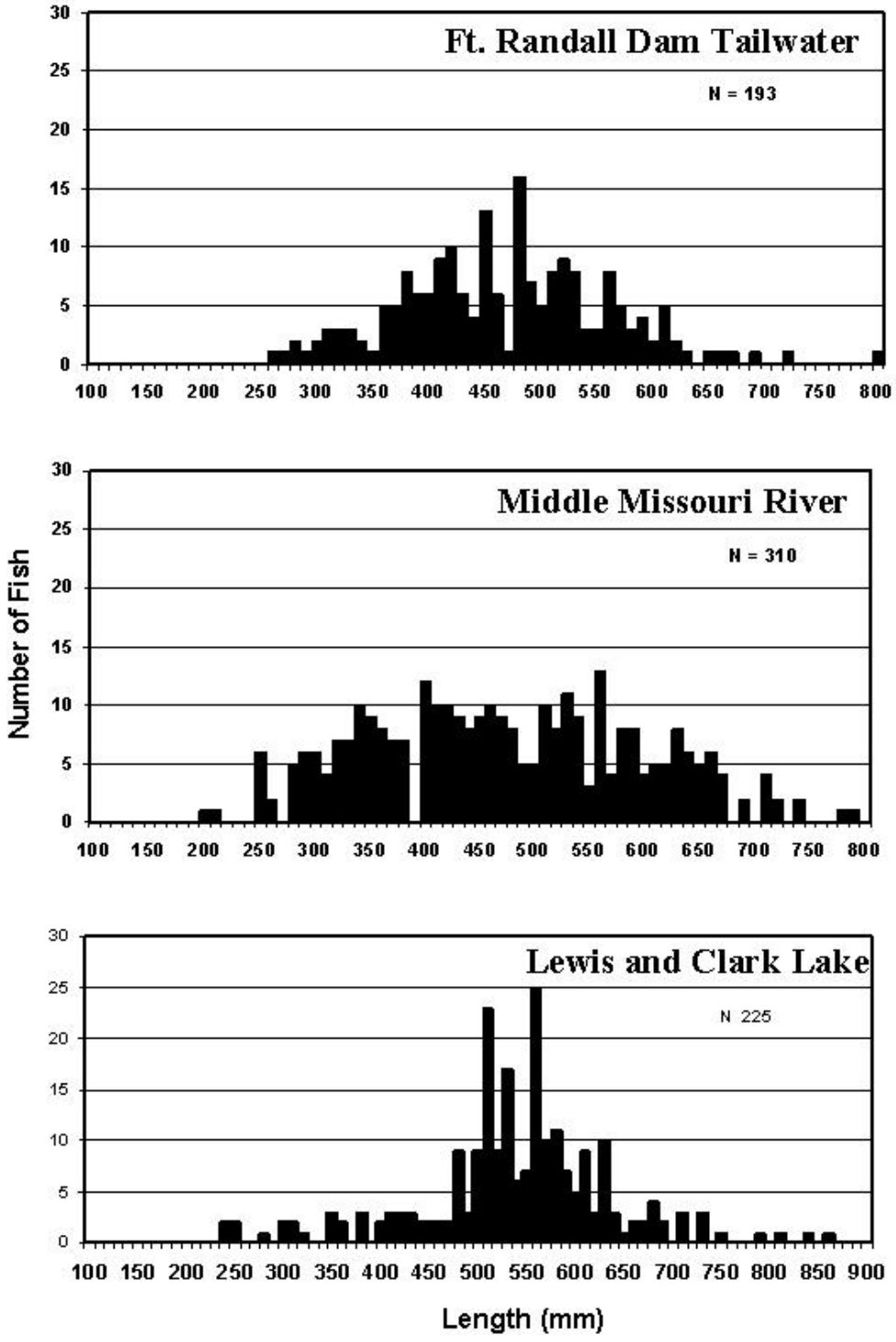

Figure 3. Length frequencies of angler-harvested channel catfish in the Missouri River, from Ft. Randall Dam to Gavins Point Dam during 2005. N is the sample size.

Table 9. Percent of parties that harvested the specified number of walleye per angler-trip from the Missouri River from Ft. Randall Dam to Gavins Point Dam during 2005.

Harvest per angler	Ft. Randall tailwater	Middle River	Lewis and Clark Lake
4.0	0	2.6	4.3
3.0-3.9	6.9	9.3	5.6
2.0-2.9	11.8	16.7	12.4
1.0-1.9	18.3	20.1	16.2
0.1-0.9	40.4	33.1	17.5
0	22.7	18.3	43.9

Table 10. Percent of parties that harvested the specific number of channel catfish per angler-trip from the Missouri River from Ft. Randall Dam to Gavins Point Dam during 2005.

Harvest per angler	Ft Randall tailwater	Middle River	Lewis and Clark Lake
10.0	0	0.9	0
9.0-9.9	0	0	0
8.0-8.9	0	1.2	0
7.0-7.9	0	0	0
6.0-6.9	6.4	0	0
5.0-5.9	0.6	3.3	6.3
4.0-4.9	5.1	4.9	5.9
3.0-3.9	5.7	7.0	5.4
2.0-2.9	14.6	16.2	9.2
1.0-1.9	14.6	7.4	10.2
0.1-0.9	32.5	21.7	36.9
0	20.4	37.3	26.2

Fish Released

An estimated 46,431 (+/- 10,232, 90% CI) fish were released by anglers fishing the Missouri River between Ft. Randall and Gavins Point Dams during the March through November 2005 period (Table 11). The most fish were released at Lewis and Clark Lake (Zone 3) and the fewest fish were released at Ft. Randall Dam tailwater (Zone 1). Walleye, channel catfish, and smallmouth bass were the most often released species. The 381-mm minimum length limit on walleye, during most or all of the year, depending upon survey zone, may have contributed to the high percentage of walleye released. Fewer sauger than walleye were released, but they too had a length limit during most or all of the year, depending upon zone. Many anglers have trouble differentiating sauger from walleye. Undoubtedly, some released sauger were reported as walleye. In a 2001 survey of a similar Missouri River reach, walleye were more likely to be released than sauger (Wickstrom et al. 2002).

The "Other" category (Table 11) contained some noteworthy species released during 2005. An estimated 1,355 (+/- 1,382, 90% CI) brown trout were released at Ft. Randall Dam tailwater (Zone 1). An estimated 254 (+/- 200, 90% CI) sturgeon were released in the Middle Missouri River (Zone 2). An estimated 1,963 (+/- 707, 90% CI) common carp and 648 (+/- 460, 90% CI) bluegill were released at Lewis and Clark Lake (Zone 3).

Table 11. Estimated fish released, by species and zone, for the Missouri River from Ft. Randall Dam to Gavins Point Dam during March through November 2005. (90 % CI).

Zone	Walleye	Sauger	Channel catfish	Smallmouth bass	Largemouth bass	White bass	Freshwater drum	Other*	Total
1	624 (207)	88 (64)	454 (166)	1,484 (683)	479 (648)	234 (93)	2,637 (894)	2,362 (2,039)	8,363 (2,398)
2	1,586 (601)	244 (137)	4,656 (3,832)	1,751 (758)	67 (58)	19 (28)	256 (141)	1,258 (969)	9,835 (3,406)
3	9,120 (1,850)	1,085 (344)	721 (246)	4,994 (1,479)	1,502 (699)	1,970 (617)	4,320 (1,494)	4,520 (2,676)	28,233 (4,428)
Total	11,330 (2,658)	1,417 (447)	5,831 (4,244)	8,229 (2,920)	2,048 (1,405)	2,223 (738)	7,213 (2,529)	8,140 (5,684)	46,431 (10,232)

* Other includes: black bullhead, black crappie, bluegill, brown trout, buffalo, burbot, common carp, flathead catfish, gar, green sunfish, goldeye, northern pike, paddlefish, redear sunfish, rock bass, shorthead redhorse, sturgeon, yellow perch, white crappie, and white sucker,

Harvest, Release, and Catch Rates

Estimated total harvest rates, for all species and months combined, ranged from 0.19 fish/angler-h (+/- 0.18, 90% CI) to 0.33 fish/angler-h (+/- 0.25, 90% CI) during 2005 for survey zones 1-3 (Figure 1) on the Missouri River from Ft. Randall Dam to Gavins Point Dam (Table 12 to Table 14). Harvest rates for all species combined exceeded 0.4 fish/angler-h in April, July, August, and October at Ft. Randall Dam tailwater (Table 12). The mean hourly catch rate of all fish combined for the middle Missouri River zone surpassed 1.0 fish/angler-h in June (Table 13). Harvest rates for all species combined peaked during August in Lewis and Clark Lake, at 0.42 fish/angler-h (Table 14).

Table 12. Estimated harvest rate, release rate, and catch rate, by month, with species combined, for Ft. Randall Dam tailwater during 2005 (90 % CI).

Month	Harvest rate (fish/angler-h)	Release rate (fish/angler-h)	Catch rate (fish/angler-h)
March	0.19 (0.23)	0.22 (0.28)	0.41 (0.48)
April	0.44 (0.51)	0.21 (0.22)	0.66 (0.74)
May	0.14 (0.13)	0.14 (0.10)	0.28 (0.18)
June	0.21 (0.19)	0.14 (0.12)	0.35 (0.30)
July	0.44 (0.28)	0.42 (0.28)	0.86 (0.54)
August	0.44 (0.30)	0.51 (0.32)	0.95 (0.52)
September	0.32 (0.16)	0.30 (0.18)	0.63 (0.26)
October	0.51 (0.47)	0.12 (0.11)	0.63 (0.52)
November	0.15 (0.23)	0.31 (0.42)	0.45 (0.65)
Combined	0.33 (0.25)	0.29 (0.21)	0.62 (0.41)

At Ft. Randall Dam tailwater (Zone 1; Figure 1) during 2005, channel catfish had high catch and harvest rates, when compared to other species (Table 15). And the majority of freshwater drum caught were released. In the Middle Missouri River (Zone 2; Figure 1), channel catfish had a high catch, release, and harvest rate compared to other species (Table 16). At Lewis and Clark Lake (Zone 3; Figure 1) during 2005, walleye had high harvest, release, and catch rates compared to other species (Table 17).

Table 13. Estimated harvest rate, release rate, and catch rate, by month, with species combined, for the Middle Missouri River during 2005 (90 % CI).

Month	Harvest rate (fish/angler-h)	Release rate (fish/angler-h)	Catch rate (fish/angler-h)
March	0.14 (0.18)	0.09 (0.11)	0.23 (0.29)
April	0.17 (0.19)	0.11 (0.11)	0.28 (0.28)
May	0.23 (0.14)	0.82 (1.04)	1.05 (0.97)
June	0.27 (0.28)	0.08 (0.06)	0.36 (0.30)
July	0.21 (0.19)	0.22 (0.16)	0.43 (0.21)
August	0.24 (0.38)	0.40 (0.19)	0.65 (0.50)
September	0.18 (0.12)	0.58 (0.63)	0.76 (0.74)
October	0.05 (0.05)	0.07 (0.05)	0.11 (0.07)
November	0.10 (0.15)	0.09 (0.13)	0.19 (0.17)
Combined	0.19 (0.18)	0.34 (0.44)	0.53 (0.47)

Table 14. Estimated harvest rate, release rate, and catch rate, by month, with species combined, for Lewis and Clark Lake during 2005 (90 % CI).

Month	Harvest rate (fish/angler-h)	Release rate (fish/angler-h)	Catch rate (fish/angler-h)
March	0.20 (0.42)	0.08 (0.18)	0.28 (0.42)
April	0.27 (0.25)	0.35 (0.26)	0.62 (0.47)
May	0.21 (0.16)	0.40 (0.28)	0.61 (0.42)
June	0.29 (0.19)	0.30 (0.18)	0.59 (0.37)
July	0.08 (0.05)	0.15 (0.18)	0.23 (0.21)
August	0.42 (0.60)	0.24 (0.11)	0.66 (0.59)
September	0.12 (0.13)	0.31 (0.14)	0.43 (0.23)
October	0.13 (0.12)	0.28 (0.13)	0.41 (0.19)
November	0.06 (0.07)	0.14 (0.17)	0.20 (0.19)
Combined	0.20 (0.20)	0.28 (0.16)	0.48 (0.30)

Table 15. Estimated harvest rate, release rate, and catch rate, by species, for Ft. Randall Dam tailwater, for the March through November 2005 period (90 % CI). T (trace) represents values <0.01.

Month	Harvest rate (fish/angler-h)	Release rate (fish/angler-h)	Catch rate (fish/angler-h)
Walleye	0.06 (1.00)	0.02 (0.03)	0.08 (0.12)
Sauger	T	T	T
Channel catfish	0.12 (0.12)	0.01 (0.01)	0.13 (0.12)
Smallmouth bass	0.02 (0.04)	0.05 (009)	0.06 (0.10)
Largemouth bass	T	0.01 (0.06)	0.01 (0.06)
White bass	0.04 (0.06)	0.01 (0.01)	0.04 (0.06)
Freshwater drum	0.01 (0.02)	0.12 (0.11)	0.13 (0.11)
Other	0.08 (0.23)	0.07 (0.17)	0.16 (0.35)
Combined	0.33 (0.25)	0.29 (0.21)	0.62 (0.41)

Other includes: black crappie, bluegill, brown trout, buffalo, burbot, gar, common carp, goldeye, flathead catfish, northern pike, rainbow trout, rock bass, shorthead redhorse, yellow perch, white crappie, and white sucker.

Table 16. Estimated harvest rate, release rate, and catch rate, by species ,for the Middle Missouri River, for the March through November 2005 period (90 % CI). T (trace) represents values <0.01.

Species	Harvest rate (fish/angler-h)	Release rate (fish/angler-h)	Catch rate (fish/angler-h)
Walleye	0.03 (0.05)	0.05 (0.07)	0.07 (0.10)
Sauger	0.03 (0.05)	0.01 (0.01)	0.04 (0.06)
Channel catfish	0.11 (0.16)	0.20 (0.46)	0.31 (0.50)
Smallmouth bass	0.01 (0.01)	0.04 (0.07)	0.04 (0.07)
Largemouth bass	T	T	T
White bass	T	T	T
Freshwater drum	T	T	T
Other	0.01 (0.04)	0.04 (0.12)	0.05 (0.14)
Combined	0.19 (0.18)	0.34 (0.44)	0.53 (0.47)

Other includes: bigmouth buffalo, black bullhead, black crappie, bluegill, common carp, flathead catfish, gar, northern pike, rock bass, shorthead redhorse, sturgeon, and white sucker.

Table 17. Estimated harvest rate, release rate, and catch rate, by species, for Lewis and Clark Lake, for the March through November 2005 period (90 % CI). T (trace) represents values <0.01.

Month	Harvest rate (fish/angler-h)	Release rate (fish/angler-h)	Catch rate (fish/angler-h)
Walleye	0.06 (0.06)	0.09 (0.09)	0.16 (0.14)
Sauger	0.01 (0.03)	0.01 (0.03)	0.03 (0.05)
Channel catfish	0.05 (0.06)	0.01 (0.01)	0.05 (0.06)
Smallmouth bass	T	0.05 (0.07)	0.05 (0.07)
Largemouth bass	0.01(0.03)	0.01 (0.01)	0.02 (0.04)
White bass	0.02 (0.04)	0.02 (0.02)	0.04 (0.05)
Freshwater drum	T	0.05 (0.06)	0.05 (0.06)
Other	0.04 (0.20)	0.06 (0.14)	0.10 (0.28)
Combined	0.20 (0.20)	0.28 (0.20)	0.48 (0.30)

Other includes: black bullhead, black crappie, bluegill, common carp, flathead catfish, gar, green sunfish, goldeye, northern pike, paddlefish, redear sunfish, rock bass, shorthead redhorse, sturgeon, yellow perch, and white crappie.

Angler Demographics

Anglers from 15 states were contacted during angler interviews at the Missouri River from Ft. Randall Dam to Gavins Point Dam during 2005 (Table 18). Percentage of resident anglers (Nebraska and South Dakota combined) ranged from over 86% to more than 94%. Resident anglers recently comprised 74% of all anglers at Lake Oahe, SD (Lott et al. 2004); 84% at Lake Sharpe, SD (Lott et al. 2006); and 63% at Lake Francis Case, SD (Sorensen 2004). Resident angling activity for the Ft. Randall Dam to Gavins Point Dam reach ranged from 84% to 96% during previous surveys (Stone 1985; Wickstrom 1995; Wickstrom 1996: Mestl et al. 2001; Wickstrom 2001; Wickstrom et al. 2002).

County of residence for South Dakota and Nebraska anglers fishing the Missouri River from Ft. Randall Dam to Gavins Point Dam is depicted in Figure 4. Approximately 38% of all trips were comprised of resident anglers originating from Knox County, Nebraska and Bon Homme and Yankton Counties, South Dakota. Anglers from Douglas, Madison, Cedar, Holt, and Pierce Counties, Nebraska and Charles Mix County, South Dakota each accounted for five to ten percent of the total angling trips.

Table 18. Percentage of state residency for anglers who fished at the Missouri River from Ft. Randall Dam to Gavins Point Dam during 2005.

State	Zone		
	Ft. Randall tailwater	Middle River	Lewis and Clark Lake
Alaska	0	0.1	0
California	0.3	0	0
Colorado	0	0.6	0.3
Idaho	0	2.3	0.1
Iowa	11.8	1.5	6.5
Kansas	0	0.5	0.1
Michigan	0	0	0.3
Minnesota	0.6	0	1.0
Missouri	0.9	0	0.1
Nebraska	17.4	85.5	38.2
Ohio	0	0.4	0.2
South Carolina	0	0	0.1
South Dakota	69.1	8.7	52.6
Wisconsin	0	0	0.1
Wyoming	0	0.3	0

Walleye was the most preferred species for anglers fishing the Missouri River from Ft. Randall Dam to Gavins Point Dam during 2005 (Table 19). Channel catfish ranked second as a single species in all zones. Smallmouth bass had its highest ranking at Lewis and Clark Lake. "Anything" ranked high in all zones.

Mean party size was slightly more than two persons and mean trip length ranged from 3.26 h to 5.2 h for anglers fishing the Missouri River, from Ft. Randall Dam to Gavins Point Dam (Zones 1 – 3; Figure 1; Table 20), during March through November 2005. Estimated economic impact for fishing activity on Lewis and Clark Lake and the Missouri River upstream to Ft. Randall Dam during 2005 was $2,301,957. This value was based on an estimated 37,737 angler trips at a cost of $61/trip (U.S. Dept. of Interior, Fish and Wildlife Service, and U.S. Dept. of Commerce, Bureau of the Census 2002).

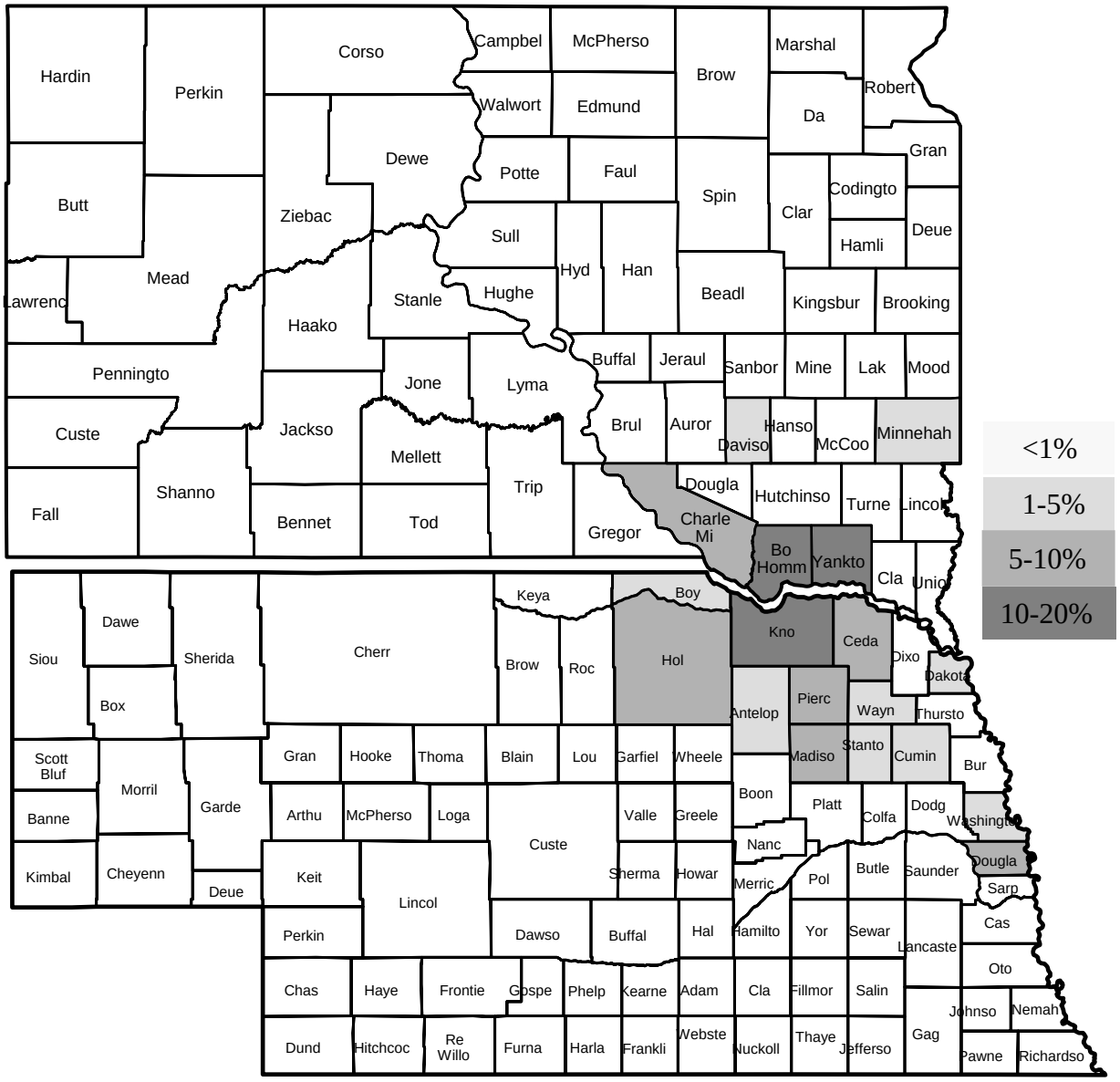

Figure 4. Percentage of angler contacts on the Missouri River from Ft. Randall Dam to Gavins Point Dam, by residence of listed counties, during March through November 2005.

Table 19. Percentage of anglers fishing for a preferred fish species in the Missouri River from Ft. Randall Dam to Gavins Point Dam during 2005.

Species	Zone		
	Ft. Randall tailwater	Middle River	Lewis and Clark Lake
Walleye	61	43	50
Channel catfish	8	17	12
Northern pike	1	0	1
Trout/brown trout	6	0	0
Smallmouth bass	4	4	7
Largemouth bass	0	0	2
Crappie	1	1	3
White bass	1	0	1
Bluegill	1	0	1
Catfish	0	7	0
Flathead catfish	0	1	0
Anything	18	27	24

Table 20. Mean party size and completed trip length for anglers fishing the Missouri River from Ft. Randall Dam to Gavins Point Dam during 2005.

Zone	Party size	Number surveyed	Trip length (h)	Number surveyed
Ft. Randall	2.28	298	3.26	670
Middle River	2.10	458	5.20	858
Lewis and	2.01	721	4.47	1,181

Angler Trip Satisfaction

Anglers fishing the Missouri River from Ft. Randall Dam to Gavins Point Dam were mostly dissatisfied with their fishing trip during 2005 (Table 21). The poorest fishing trip rating was obtained at Ft. Randall Dam tailwater, where the highest percentage of anglers rated their trip as poor. The highest percentage of excellent ratings was also obtained at Ft. Randall Dam tailwater. The Middle Missouri River had the highest percentage of respondents rating their trips as good to excellent.

Table 21. Response of anglers fishing the Missouri River from Ft Randall Dam to Gavins Point Dam, by zone, to the question: "How satisfied are you with your fishing today?"

Answer response	Ft. Randall tailwater		Middle River		Lewis and Clark Lake	
	Number	%	Number	%	Number	%
Excellent	48	7.1	17	1.8	50	3.5
Very	17	2.5	42	4.4	57	3.9
Good	68	10.0	142	14.8	170	11.8
OK	124	18.2	198	20.6	288	19.9
Poor	423	62.2	561	58.4	881	60.9
Total	680	100	960	100	1446	100

CONCLUSIONS

Fishing was poorer during 2005 than previous years for the majority of the Missouri River from Ft. Randall Dam to Gavins Point Dam. Although the amount of fishing activity at Lewis and Clark Lake during 2005 was not statistically different from 2001, fishing activity at Ft. Randall Dam tailwater and the Middle Missouri River was among the lowest documented. High gasoline prices and unstable weather in the region during the summer of 2005 may have negatively affected travel for recreation.

Channel catfish and walleye dominated the harvest but white bass and bluegill were prominent in the harvest as well. Freshwater drum was not as important to the fishery in 2005 as in 2001 (Wickstrom et al 2002). As observed through angler contacts, compliance with the 381 mm walleye and sauger length limit was good, which should allow the regulation to meet the intended objective of extending the time strong year-classes are available to anglers.

Sauger was not well represented in the harvest and probably could contribute more to the fishery given their abundance and population size structure (Wickstrom, in press). Largemouth bass, white bass, and bluegill were primarily important at Lewis and Clark Lake where most of their harvest occurred.

Catch rates and harvest rates of all species combined, for the Ft. Randall Dam to Gavins Point Dam reach, during 2005 were as good or better than 2001, the most recent previous survey year. However, catch rates and harvest rates of game fish species were generally poorer than 2001. This indicates that most of the catch in 2005 was of non-game fish species which generally are not satisfactory to recreational anglers.

Anglers were mostly dissatisfied with their fishing experience during 2005. Approximately 60% of the anglers rated their fishing experience as poor.

Even though total fishing activity from 2001 to 2005 was similar, the number of angler trips declined. The Lewis and Clark Lake Strategic Plan objective of 25,000 angler trips annually was nearly met. Of the 37,700 angler trips that occurred between Ft. Randall and Gavins Point Dams in 2005, almost 23,000 angler trips were to Lewis and Clark Lake. The total catch rate objective of 0.5 fish /h was exceeded. Catch rates, for all species combined, ranged from 0.48 fish/h to 0.62 fish/h for Missouri River angler use and harvest survey zones between Ft. Randall and Gavins Point in 2005.

RECOMMENDATIONS

1. Continue to conduct angler use and harvest surveys at three to five year intervals to assess angler resource use and fish harvest. These surveys provide a measure of progress towards the objectives in the Missouri River Fisheries Program strategic Plan.

2. Continue to include attitude and preference questions in angler interviews. The answers convey angler opinions of fisheries management success or failure.

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APPENDICES

Appendix 1. Access sites surveyed during March through November 2005.

Zone		State	Site	River mile
1	Fort Randall	SD	Fort Randall	881.1
			Randall Creek	881.7
2	Middle River	Nebraska	Boyd County	868.2
			Verdel	853.0
			Niobrara Bridge	846.0
			Niobrara	844.9
			Ferry Landing	843.0
			Bazile Creek	840.8
		SD	Running Water	843.0
3	Lewis and Clark Lake	SD	Bottom Road	837.0
			Springfield	834.0
			Sand Creek	831.0
			Snatch Creek	829.6
			Navratlis Cove	828.0
			Charley Creek	826.5
			Tabor	821.9
			Gavins Point	816.5
			Midway	814.9
			Yankton Marina	813.4
		NE	Miller Creek	822.9
			Bloomfield	821.4
			Weigand Marina	818.0
			South Shore	813.4

Appendix 2. Common and scientific names of fishes mentioned in this report.

Common name	Scientific name
Bigmouth buffalo	*Ictiobus cyprinellus*
Black bullhead	*Ictalurus melas*
Black crappie	*Pomoxis nigromaculatus*
Bluegill	*Lepomis macrochirus*
Brown trout	*Salmo tuttra*
Burbot	*Lota lota*
Channel catfish	*Ictalurus punctatus*
Common carp	*Cyprinus carpio*
Flathead catfish	*Pylodictus olivaris*
Freshwater drum	*Aplodinotus grunniens*
Green sunfish	*Lepomis cyanellus*
Goldeye	*Hidon alosoides*
Largemouth bass	*Micropterus salmoides*
Northern pike	*Esox lucius*
Paddlefish	*Polyodon spathula*
Redear sunfish	*Lepomis microlophus*
Rainbow trout	*Oncorhynchus mykiss*
Rock bass	*Ambloplites ruprestris*
Sauger	*Stizostedion canadense*
Shorthead redhorse	*Moxostoma macrolepidotum*
Shortnose gar	*Lepisosteus platostomus*
Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Smallmouth bass	*Micropterus dolomieu*
Smallmouth buffalo	*Ictiobus bubalus*
Walleye	*Stizostedion vitreum*
White bass	*Morone chrysops*
White crappie	*Pomoxis annularius*
White sucker	*Catostomus commersoni*
Yellow perch	*Perca flavescens*